REMARKS

Claims 1-20 are pending in this application. By this Amendment, Applicant AMENDS claim 1-12, 14, and 15 and ADDS claims 16-20.

It is noted that Figs. 6A, 6B, 7, 8A, 8B, 9A, and 9B illustrate only that which is old. Accordingly, Applicant has amended Figs. 6A, 6B, 7, 9A, and 9B in the accompanying Request for Approval of Proposed Drawings Corrections to be designated as --Prior Art--.

Claim 1 was rejected under 35 U.S.C. §102(e) as being anticipated by Kawai et al. Pursuant to MPEP § 201.15, Applicant has provided a certified English translation of the foreign priority document to overcome this rejection. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. §102(e).

Claims 1-8 were rejected under 35 U.S.C. §102(b) as being anticipated by Lee et al. (US 5,780,740). Claims 9-15 were rejected under 35 U.S.C. §103(a) as being obvious over Lee et al. in view of Yamashita et al. (US 5,952,572). Applicant respectfully traverses the rejections of claims 1-15.

Claim 1 has been amended to recite:

> "A resonant element comprising:
> a substrate defining orthogonal X- and Y-directions and further defining a Z-direction orthogonal to both the X- and Y-directions;
> a vibrating body opposed to the substrate and vibratable in the orthogonal X-and Z-directions;
> a vibration exciting member for causing said vibrating body to be subjected to an excitation vibration in the X-direction;
> a detecting electrode disposed on the substrate for detecting any deflection of said vibrating body in the Z-direction during the excitation vibration thereof in the X-direction; and
> **a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode for inhibiting the deflection of said vibrating body in the Z-direction**." (emphasis added)

Claim 9 has been amended to recite:

"An angular velocity sensor comprising:
a vibrating body vibratable in orthogonal X- and Z-directions;
an exciting member for causing said vibrating body to be subjected to an excitation vibration in the X-direction;
a detecting electrode for detecting any deflection of said vibrating body in the Z-direction during the excitation vibration thereof in the X-direction, said detecting electrode detects variation in an electrostatic capacity with respect to said vibrating body in response to a deflection thereof in the Z-direction;
a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode for inhibiting the deflection of said vibrating body in the Z-direction; and
wherein the electrostatic capacity detected by said detecting electrode is converted into a voltage." (emphasis added)

Applicant's claims 1 and 9 recite the feature of "a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode for inhibiting the deflection of said vibrating body in the Z-direction." With respect to claim 1, the Examiner has alleged that Lee et al. shows an "excitation deflection inhibiting means ... (col. 9, lines 55-65)" in paragraph #1 of the Office Action. Lee et al. clearly fails to teach or suggest the use of **two** conductive portions and the unique arrangement thereof with respect to the detecting electrode to inhibit the deflection of the vibrating body. The Examiner should note that the unique arrangement and function of the two conductive portions recited in Applicant's claim 1 are significant because they can be used to tilt the vibrating body, as can be seen in Applicant's **Fig. 6B**. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-8 under 35 U.S.C. §102(b) as being anticipated by Lee et al.

With respect to claim 9, Applicant agrees with the Examiner that Lee et al. that does not show converting the detected electrostatic capacity into voltage. The Examiner has relied upon Yamashita to cure this deficiency. However, neither reference teaches or suggests "a first conductive portion disposed on the substrate on one side of

the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode for inhibiting the deflection of said vibrating body in the Z-direction" as recited in Applicant's claim 9. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 9-11 under 35 U.S.C. §103(a) as being obvious over Lee et al. in view of Yamashita et al.

Claim 12 has been amended to recite:

" A method for adjusting the vibration of a resonant element comprising the steps of:

providing a resonant element including a vibrating body vibratable in orthogonal X- and Z-directions, an exciting member for causing said vibrating body to be subjected to an excitation vibration in an X -direction, a detecting electrode for detecting the variation in an electrostatic capacity with respect to said vibrating body in response to the deflection thereof in the Z-direction, and a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode which provide electrostatic attractive forces to said vibrating body and which inhibit the deflection of said vibrating body in a Z-direction during the excitation vibration thereof in the X-direction;

detecting the variation in the detected electrostatic capacity by said detecting electrode as a deflection of said vibrating body in the Z-direction while the vibrating body is caused to be subjected to an excitation vibration in the X-direction by said exciting member; and

controlling said electrostatic attractive forces provided to said vibrating body by said first and second conductive portions in a direction such that the variation in the detected electrostatic capacity by said detecting electrode is canceled." (emphasis added)

Claim 15 has been amended to recite:

"A method for adjusting the vibration of a resonant element in an angular velocity sensor and then determining angular velocity, comprising:

providing a resonant element including a vibrating body vibratable in orthogonal X- and Z-directions, an exciting member for causing said vibrating body to be subjected to an excitation vibration in an X -direction, a detecting electrode for detecting the variation in an electrostatic capacity with respect to said vibrating body in response to deflection or vibration thereof in the Z-direction, a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting

electrode which provide electrostatic attractive forces to said vibrating body and which inhibit the deflection of said vibrating body in a Z-direction during the excitation vibration thereof in the X-direction and a circuit for converting the detected electrostatic capacity by said detecting electrode into a voltage;

detecting a first variation in the detected electrostatic capacity by said detecting electrode caused by a deflection of said vibrating body in the Z-direction while the vibrating body is caused to be subjected to an excitation vibration in the X-direction by said exciting member;

controlling said electrostatic attractive forces provided to said vibrating body by said first and second conductive portions in a direction such that the variation in the first detected electrostatic capacity by said detecting electrode is canceled;

applying an angular velocity to said resonant element about a Y-axis orthogonal to said X-and Z- directions to cause said resonant body to vibrate in the Z-direction due to a Coriolis force;

detecting vibration of said vibrating body in the Z-direction due to said Coriolis force utilizing a second variation in the electrostatic capacity detected by said detecting electrode; and

converting said second variation in electrostatic capacity into a voltage using said circuit, said voltage being representative of said angular velocity." (emphasis added)

Applicant's claim 12 recites the step of "controlling said electrostatic attractive forces provided to said vibrating body by said first and second conductive portions in a direction such that the variation in the detected electrostatic capacity by said detecting electrode is canceled." Applicant's claim 15 recites a similar method step. The Examiner has completely ignored this feature in Applicant's claims 12 and 15. Therefore, the Examiner has failed to establish a prima facie case of obviousness of the claimed invention because all the claim limitations must be taught or suggested by the prior art. See In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) and MPEP § 706.02(j) and § 2143.03. The significance of this step is shown in Applicant's **Fig. 2** where curve **A** represents a detection signal even when no rotation of the resonant element occurs and curve **B** represents the correction to the detection signal. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-15 under 35 U.S.C. §103(a) as being obvious over Lee et al. in

view of Yamashita et al.

Newly added claim 16 recites:

"A resonant element comprising:
a substrate defining orthogonal X- and Y-directions and further defining a Z-direction orthogonal to both the X- and Y-directions;
a vibrating body opposed to the substrate and vibratable in the orthogonal X-and Z-directions;
a vibration exciting member for causing said vibrating body to be subjected to an excitation vibration in the X-direction;
a detecting electrode disposed on the substrate for detecting any deflection of said vibrating body in the Z-direction during the excitation vibration thereof in the X-direction; and
at least one conductive portion disposed on the substrate for inhibiting the deflection of said vibrating body in the Z-direction;
wherein **the vibrating body is supported by hooked-claw shaped beams which contact the substrate in a region exterior to a region defined by the vibrating body and the vibration exciting member**." (emphasis added)

Applicant's claims 16 recites that the resonant element has the feature of "the vibrating body is supported by hook-shaped beams which contact the substrate in a region exterior to a region defined by the vibrating body and the vibration exciting member." These support beams are clearly described in the first full paragraph on page 22 of Applicant's specification. Neither Lee et al. nor Yamashita et al. show the feature of using hooked-claw shape support beams. Lee et al. shows springs **103** and **104** that are planar shaped with rectangular holes, **NOT** hooked-claw shaped support beams as recited in Applicant's claim 16. Yamashita et al. shows only rectangular support beams **103**, **NOT** hooked-claw shaped support beams as recited in Applicant's claim 16.

Accordingly, Applicant respectfully submits that Lee et al. and Yamashita et al., applied alone or in combination, fail to teach or suggest the unique combination and arrangement of elements and steps recited in claims 1, 9, 12, 15, and 16 of the present application. Claims 2-8; 10-11; 13-14, 17, and 19; 18 and 20 depend upon claims 1, 9, 12 and 15, respectively; therefore, claims 2-8, 10-11, 13-14, and 17-20 are allowable for at least the reasons that claims 1, 9, 12, 15, and 16 are allowable.

In view of the foregoing amendments and remarks, Applicant respectfully submits

that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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VERSION WITH MARKINGS SHOWING CHANGES MADE

1. A resonant element comprising:

a substrate defining orthogonal X- and Y-directions and further defining a Z-direction orthogonal to both the X- and Y-directions;

a vibrating body opposed to the substrate and vibratable in the orthogonal X-and Z-directions;

a vibration exciting member [means] for causing said vibrating body to be subjected to an excitation vibration in the X-direction;

[excitation deflection] a detecting electrode [means] disposed on the substrate for detecting any deflection of said vibrating body in the Z-direction during the excitation vibration thereof in the X-direction; and

a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode [excitation deflection inhibiting means] for inhibiting the deflection of said vibrating body in the Z-direction.

2. A resonant element as claimed in claim 1, wherein:

said resonant element [constitutes] includes an angular velocity sensor for detecting the angular velocity around a Y-axis orthogonal to said X- and Z- directions based on vibration of said vibrating body in the Z-direction by a Coriolis force [; and

said excitation deflection means also serve as Z-direction vibration detecting means for detecting vibration of said body in the Z-direction].

3. A resonant element as claimed in claim 1 or 2, wherein:

[said excitation deflection detecting means is constituted of a] the detecting electrode [for detecting] detects variation in an electrostatic capacity with respect to said vibrating body in response to a vibration or deflection thereof in the Z-direction.

4. A resonant element as claimed in claim 1 or 2, wherein:

[said vibrating body is disposed so as to be opposed to a plane in the X- Y directions of a fixed substrate; and]

said vibrating body [constitutes] includes a planar vibrating body supported by said [fixed] substrate via support beams so as to be vibratable in the X-direction.

5. A resonant element as claimed in claim 3, wherein:

[said vibrating body is disposed so as to be opposed to a plane in the X- Y directions of a fixed substrate; and]

said vibrating body [constitutes] includes a planar vibrating body supported by said [fixed] substrate via support beams so as to be vibratable in the X-direction.

6. A resonant body, as claimed in claim 5, wherein said vibrating body is electrically conductive and [said excitation deflection detecting means comprises a] the detecting electrode is spaced from said vibrating body such that an electrostatic capacitance is developed between said vibrating body and said electrode.

7. A resonant body, as claimed in claim 6, wherein said vibrating body is disposed above said [fixed] substrate and said detection electrode is disposed on a surface of said [fixed] substrate below said vibrating body.

8. A resonant body, as claimed in claim 6, wherein said vibrating body is disposed above said [fixed] substrate and said detection electrode is disposed in a cavity in said [fixed] substrate below said vibrating body.

9. An angular velocity sensor comprising:

a vibrating body vibratable in orthogonal X- and Z-directions;

an exciting member [means] for causing said vibrating body to be subjected to an excitation vibration in the X-direction;

a [excitation deflection] detecting electrode [means] for detecting any deflection of said vibrating body in the Z-direction during the excitation vibration thereof in the X-direction, said [excitation deflection detecting means including a] detecting electrode detects [for detecting] variation in an electrostatic capacity with respect to said vibrating body in response to a deflection thereof in the Z-direction;

a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode [excitation deflection inhibiting means] for inhibiting the deflection of said vibrating body in the Z-direction; and

[capacity-voltage converting means for converting the variation in] wherein the electrostatic capacity detected by said detecting electrode is converted into a voltage.

10. An angular velocity detector, as claimed in claim 9, wherein said vibrating body is rotatable about the Y-axis orthogonal to said X- and Z-directions to thereby impart an angular velocity to said vibrating body which causes said body to vibrate in the Z-direction due to a Coriolis force and said [excitation deflection] detection electrode detects [means also serves as Z-direction vibration detecting means for detecting] the vibration of said vibrating body in the Z-direction.

11. An angular velocity detector, as claimed in claim 9, [wherein said capacity-voltage converting means comprises an] further comprising a FET which converts the electrostatic capacity into a voltage.

12. A method for adjusting the vibration of a resonant element comprising the steps of:

providing a resonant element including a vibrating body vibratable in orthogonal X- and Z-directions, an exciting member [means] for causing said vibrating body to be subjected to an excitation vibration in an X -direction, a detecting electrode for detecting the variation in an electrostatic capacity with respect to said vibrating body in response to the deflection thereof in the Z-direction, and [excitation deflection inhibiting means] a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode which provide[s] electrostatic attractive forces to said vibrating body and which inhibit[s] the deflection of said vibrating body in a Z-direction during the excitation vibration thereof in the X-direction;

detecting the variation in the detected electrostatic capacity by said detecting electrode as a deflection of said vibrating body in the Z-direction while the vibrating body is caused to be subjected to an excitation vibration in the X-direction by said exciting member [means]; and

controlling said electrostatic attractive forces provided to said vibrating body by said [excitation deflection inhibiting means] first and second conductive portions in a direction such that the variation in the detected electrostatic capacity by said detecting electrode is canceled.

14. A method for adjusting the vibration of a resonant element as claimed in claim 13, wherein:

the detected electrostatic capacity by said detecting electrode is converted into a voltage using [capacity-voltage converting means comprising an] a FET.

15. A method for adjusting the vibration of a resonant element in an angular velocity sensor and then determining angular velocity, comprising:

providing a resonant element including a vibrating body vibratable in orthogonal X- and Z-directions, an exciting member [means] for causing said vibrating body to be

subjected to an excitation vibration in an X -direction, a detecting electrode for detecting the variation in an electrostatic capacity with respect to said vibrating body in response to deflection or vibration thereof in the Z-direction, [excitation deflection inhibiting means] a first conductive portion disposed on the substrate on one side of the detecting electrode and a second conductive portion disposed on the substrate on the other side of the detecting electrode which provide electrostatic attractive forces to said vibrating body and which inhibit the deflection of said vibrating body in a Z-direction during the excitation vibration thereof in the X-direction and [capacity-voltage converting means] a circuit for converting the detected electrostatic capacity by said detecting electrode into a voltage;

detecting a first variation in the detected electrostatic capacity by said detecting electrode caused by a deflection of said vibrating body in the Z-direction while the vibrating body is caused to be subjected to an excitation vibration in the X-direction by said exciting member [means];

controlling said electrostatic attractive forces provided to said vibrating body by said first and second conductive portions [excitation deflection inhibiting means] in a direction such that the variation in the first detected electrostatic capacity by said detecting electrode is canceled;

applying an angular velocity to said resonant element about a Y-axis orthogonal to said X-and Z- directions to cause said resonant body to vibrate in the Z-direction due to a Coriolis force;

detecting vibration of said vibrating body in the Z-direction due to said Coriolis force utilizing a second variation in the electrostatic capacity detected by said detecting electrode; and

converting said second variation in electrostatic capacity into a voltage using said circuit [capacity-voltage converting means], said voltage being representative of said angular velocity.